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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Application of : Customer Number: 53080  
 Akiko FUJINO, et al. : Confirmation Number: 4156  
 Application No.: 10/555,447 : Tech Center Art Unit: 1795  
 Filed: November 03, 2005 : Examiner: Wang, Eugenia  
 For: LITHIUM SECONDARY BATTERY

**TRANSMITTAL OF APPEAL BRIEF**

Mail Stop Appeal Brief - Patents  
 Commissioner for Patents  
 P.O. Box 1450  
 Alexandria, VA 22313-1450

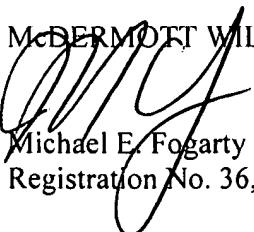
Sir:

Submitted herewith is Appellant's Appeal Brief in support of the Notice of Appeal filed February 25, 2008. Please charge the Appeal Brief fee of \$510.00 to Deposit Account 500417.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due under 37 C.F.R. 1.17 and 41.20, and in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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Docket No.: 043888-0411

PATENT

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**APPEAL BRIEF**

Mail Stop Appeal Brief - Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

This Appeal Brief is submitted in support of the Notice of Appeal filed February 25, 2008, wherein Appellant appeals from the Primary Examiner's rejection of claims 1-8.

**Real Party In Interest**

This application is assigned to Matsushita Electric Industrial Co., Ltd. by assignment recorded on January 5, 2007, at Reel 018714, Frame 0477.

**Related Appeals and Interferences**

To the best of Applicants' and Applicants representatives' knowledge, there are no related appeals or interferences (see Related Proceedings Appendix).

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**Status of Claims**

1. Claims canceled: None
2. Claims withdrawn from consideration, but not canceled: None
3. Claims pending: 1-8
4. Claims allowed: None
5. Claims rejected: 1-8
6. Claims on appeal: 1-8

**Status of Amendments**

No amendments to the claims have been made after the Final Rejection issued on October 25, 2007.

**Summary of Claimed Subject Matter**

One embodiment of the present invention as recited in independent claim 1 is directed to a lithium secondary battery comprising:

a positive electrode comprising a composite lithium oxide (Figure 1, reference #10, Spec. ¶15);  
a negative electrode comprising a material capable of absorbing and desorbing lithium (Figure 1, reference #20, Spec. ¶15);  
a separator interposed between said positive electrode and said negative electrode (Figure 1, reference #6, Spec. ¶15); and  
a non-aqueous electrolyte (Spec. ¶15),  
wherein said separator comprises non-woven fabric (Spec. ¶16),  
at least one of said positive electrode and said negative electrode has a porous film that is adhered to a surface thereof (Figure 1, reference #5, Spec. ¶20), and  
said porous film comprises an inorganic oxide filler and a binder (Spec. ¶20).

**Grounds of Rejection To Be Reviewed By Appeal**

- (1) Claims 1, 2 and 5-8 were rejected under 35 U.S.C. § 103(a) for obviousness predicated upon Yamashita et al. (USP No. 6,287,720) ("Yamashita") in view of Fujiwara et al. (USP No. 6,576,366) ("Fujiwara");.

Argument

**Claims 1, 2 and 5-8 are not obvious under 35 U.S.C. § 103(a) over Yamashita in view of Fujiwara.**

Claims 1, 2 and 5-8 were rejected under 35 U.S.C. § 103(a) over Yamashita in view of Fujiwara. Applicants respectfully traverse this rejection for at least the following reasons.

Independent claim 1 recites, in-part, a lithium secondary battery comprising a positive electrode comprising a composite lithium oxide; a negative electrode comprising a material capable of absorbing and desorbing lithium; and a separator interposed between said positive electrode and said negative electrode, wherein said separator comprises non-woven fabric and at least one of the positive electrode and the negative electrode has a porous film that is adhered to a surface thereof.

One feature of independent claim 1 lies in that the separator is comprised of a non-woven fabric and a porous film is adhered to the surface of at least one of the positive or negative electrode. As a result of this feature, the battery of the present invention exhibits superior characteristics in terms of defect rate, capacity retention rate, nail penetration safety, high temperature safety and voltage at high temperature.

It is admitted that Yamashita fails to disclose a separator comprised of non-woven fabric (October 25, 2007 Office Action (“OA”), page 3, line 18). Fujiwara discloses a series of separator materials including polyethylene (PE) and non-woven cloth in col. 9, lines 27-38 (OA, page 3, lines 20-22). It is alleged that Fujiwara teaches that non-woven cloths and PE are art recognized equivalents for separator material and accordingly, it would be obvious to one of ordinary skill in the art to replace the PE layer in Yamashita with a non-woven cloth.

However, as stated in previous responses, PE and non-woven cloth are not equivalents, and this has been demonstrated in the present disclosure. Furthermore, Applicants have shown that a battery

having the combination of a porous film and a non-woven cloth separator, as in the present invention, exhibits unexpected and superior results over a battery having a porous film alone or a porous film in combination with PE. Applicants would direct the Examiner once again to Tables 1 and 2 (see, pages 32 and 36 of the specification) which features a series of examples and comparative examples that show the advantages of using non-woven cloth with a porous film, as compared to using PE, either alone, or with a porous film.

As was previously shown in Table 1 of the present specification, the battery of Comparative Example 4 has the same porous film structure and composition as the battery of Examples 5 and 24. However, Comparative Example 4 uses a PE film (a microporous film) separator in combination with the porous film, instead of polypropylene (PP) (Example 5) or polypropylene-polyamide (PP-PA) (Example 24) non-woven fabric separator with the porous film. As Table 2 shows, Examples 5 and 24 have significantly higher discharge capacity and capacity retention rate than that of Comparative Example 4. In addition, the nail penetration safety data and the high temperature safety data is more favorable as well. As such, Applicants have provided unexpected evidence that the use of non-woven fabric is superior to PE for use in combination with porous film as a separator in a battery.

Moreover, Comparative Example 2 has no porous film, yet has a higher discharge capacity and a higher retention rate than Comparative Example 4, which, as described above, has both a PE film and porous film. Thus, the combination of PE film and a porous film actually results in a battery with inferior charging characteristics when compared to a battery without a porous film. In contrast, a combination of a PP non-woven fabric and a porous film as shown in Example 5 or PP-PA non-woven fabric and porous film (Example 24) provides superior characteristics in all areas over batteries either having no porous film, or a porous film combined with PE. Thus, contrary to the conclusions set forth in the Office Action, the present invention shows unexpected results in that a PE film and a non-woven

fabric are not equivalents, contrary to what is taught in the prior art. As such, the present invention is not obvious over the combination of Yamashita and Fujiwara.

In response to the technical evidence that the batteries of the present invention exhibit significantly better performance characteristics than batteries of the prior art, the Examiner alleges that there is no showing of unexpected results from using a non-woven separator of the present disclosure in place of the PE layer of Yamashita because the advantages and disadvantages of these materials were known at the time.

However, this allegation is in direct contradiction to the statement previously made by the Examiner. On one hand, the Examiner alleges that PE and non-woven cloth (for example PP or PP-PA) are equivalents, as suggested by Fujiwara. Yet, when presented with evidence that the non-woven cloth performs better than PE in the examples disclosed in the present application, the Examiner alleges that because the characteristics of porous film and non-woven materials were known, then the combination would be obvious. However, if PE and non-woven fabric are equivalents, then they would be expected to exhibit similar characteristics when used as a separator in a battery. Yet, as Applicants have demonstrated, the characteristics of batteries having these two materials are significantly different.

Furthermore, the Examiner appears to be confusing PE, which is a *microporous* film made by an extruding process, with a porous film comprised of an inorganic oxide filler and a binder. The Examiner states in the February 5, 2008 Advisory Action, that “Fujiwara teaches that porous films (polyethylene, as used in Yamashita et al.) and non-woven clothes are both known as separator materials (col. 9, lines 27-38)”. However, as stated above polyethylene is a microporous film.

In addition, the Examiner states that “[a]ccordingly, by using layers of both, one of ordinary skill in the art would have expected the predictable result of obtaining the advantages of both the non-woven fabric and porous film by layering them. Therefore replacing the polyethylene film in Yamashita with that of a non-woven cloth would not have yielded unexpected results”. Here is further evidence that the Examiner has confused a microporous film with a porous film. In addition, the Examiner admits that replacing PE with non-woven cloth would not have yielded unexpected results. However, as discussed above, replacing PE with non-woven cloth does yield unexpected results.

Moreover, the Examiner recites further that “one of ordinary skill in the art would have expected the capacity to be better than that of just a porous film.” Yet the Applicants have shown that when a PE film is combined with a porous film, the results are worse than without a porous film at all. Thus, the Applicants have shown a negative effect from the combination of PE with a porous film, whereas the combination of non-woven film with a porous film exhibits superior characteristics. As such, the Examiner’s allegation that the results shown in the present disclosure are expected or that the prior art suggests that PE and non-woven materials are equivalent or show similarities is contrary to the results disclosed in Table 2 of the present disclosure.

As is well known, rebuttal evidence to a finding of obviousness may include evidence that the claimed invention yields unexpectedly improved properties or properties not present in the prior art. In *re Dillon*, 919 F.2d 688, 692-93, 16 USPQ2d 1897, 1901 (Fed. Cir. 1990). As Applicants have demonstrated the superior results of a battery having a porous film and a non-woven fabric over a battery having a porous film combined with a PE film, Applicants submit that the combination of Yamashita and Fujiwara does not render claim 1 of the present invention obvious.

**All Dependent Claims Are Allowable Because The Independent Claim From Which They Depend Is Allowable**

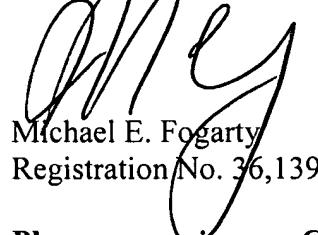
Under Federal Circuit guidelines, a dependent claim is nonobvious if the independent claim upon which it depends is allowable because all the limitations of the independent claim are contained in the dependent claims, *Hartness International Inc. v. Simplimatic Engineering Co.*, 819 F.2d at 1100, 1108 (Fed. Cir. 1987). Accordingly, as claim 1 is patentable for the reasons set forth above, it is respectfully submitted that all pending dependent claims are also in condition for allowance.

**Conclusion**

For all of the foregoing reasons, Appellants respectfully submit that the grounds of rejection of the claims on appeal is in error and should be reversed. To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

McDERMOTT WILL & EMERY LLP

  
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Registration No. 36,139

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**CLAIMS APPENDIX**

1. A lithium secondary battery comprising:

a positive electrode comprising a composite lithium oxide;

a negative electrode comprising a material capable of absorbing and desorbing lithium;

a separator interposed between said positive electrode and said negative electrode; and

a non-aqueous electrolyte,

wherein said separator comprises non-woven fabric, at least one of said positive electrode and said negative electrode has a porous film that is adhered to a surface thereof, and said porous film comprises an inorganic oxide filler and a binder.

2. The lithium secondary battery in accordance with claim 1, wherein said non-woven fabric has a thickness of not less than 15  $\mu\text{m}$  and not more than 50  $\mu\text{m}$ .

3. The lithium secondary battery in accordance with claim 1, wherein said non-woven fabric has a melt-down temperature of 150°C or more.

4. (Original) The lithium secondary battery in accordance with claim 1, wherein said non-woven fabric comprises at least one selected from the group consisting of polypropylene, polyamide, polyimide, and polyethylene terephthalate.

5. The lithium secondary battery in accordance with claim 1, wherein said porous film has a thickness of not less than 0.5  $\mu\text{m}$  and not more than 20  $\mu\text{m}$ .

6. The lithium secondary battery in accordance with claim 1, wherein said binder comprises at least a polymer having an acrylonitrile group.

7. The lithium secondary battery in accordance with claim 1, wherein said filler comprises alumina, and the content of said filler in said porous film is not less than 50% by weight and not more than 99% by weight of the total weight of the porous film.

8. The lithium secondary battery in accordance with claim 1, wherein said positive electrode and said negative electrode are wound with said separator interposed therebetween.

**EVIDENCE APPENDIX**

To the best of Applicants' and Applicants representatives' knowledge, there is no related evidence in conjunction with this Appeal Brief.

**RELATED PROCEEDINGS APPENDIX**

To the best of Applicants' and Applicants representatives' knowledge, there are no related appeals or interferences.